News

$^3He/^4He$ Values in Natural Diamonds

Values of the $^3He/^4He$ ratio in natural diamond crystals appear to be higher than the so-called primordial ratios observed in meteorites, according to a recent report by Minoru Ozima and Shigeo Zashu of the Geophysical Institute at the University of Tokyo (*Science*, March 4, 1983). The values obtained from helium fractions of 13 diamonds ranged from less than 10^{-7} to $3.2 \pm 0.25 \times 10^{-4}$, indicating a rather large enrichment of primitive helium. The measured ratios are close to those for solar-type helium.

The significance of those determinations could be two-fold, raising questions about the interpretation of helium isotope ratios from other surface samples and from other terrestrial sources. A possibility is that the diamonds may have originated in a deep, chemically isolated, and decoupled part of the earth's mantle. The problem is that this decoupling would have to be total, implying essentially no communication of the deep mantle with the rest of the earth. Ozima and Zashu prefer to think that the diamonds themselves preserved the helium ratio of a very primitive environment by being unusually depleted in uranium and thorium. This latter explanation, if correct, would mean that in at least one case, i.e., these diamonds, one cannot determine the geological evolution of $^3He/^4He$ reliably.

The study used 13 individual, industrial-grade diamond crystals of 1–2 carats each. A serious problem with the interpretation of the helium isotope ratios measured on the crystals could be that their origin is unknown. The diamonds are thought to have come from more than one South African mine, no specific location having been specified.

Two of the diamonds' ratios are 2 to 3 times higher than the accepted primordial value of meteorites ($^3He/^4He = (142 \pm 2) \times 10^{-6}$ according to J. H. Reynolds, V. Frick, J. M. Neil, and D. L. Phinney, *Geochim. Cosmochim. Acta, 42*, 1775, 1978), and on the order of ratios for solar-type helium. There was a wide range of values among the set of 13 stones. Ozima and Zashu postulate that the ratios are indigenous to their origins in the mantle. That the wide variation could be due to products of a nuclear reaction seems unlikely. The diamonds could have been in residence in the crust in diamond pipes for over 1 billion years, long enough to have taken a high dosage from the thermal neutron flux. But the reaction to produce ^3He is the following:

$$^6Li(n,\alpha)\,^3H \rightarrow {}^3He$$

About four orders of magnitude more lithium (Li) than is thought to exist in crustal rocks would have been required, however, to produce the observed concentrations of ^3He.

The other way to affect the helium ratio is to add radiogenic ^4He, and this is the process proposed to explain the results. The ^4He could have been enriched in the source mantel regimes or could have been added, perhaps to the diamonds themselves. The explanation of Ozima and Zashu is as follows: 'Diamonds with higher $^3He/^4He$ values (710^{-5}) may represent very primitive helium that evolved little since the formation of the earth. Preservation of such primitive helium throughout a geological age would be possible only in an environment where uranium and thorium contents are generally extremely small (<0.1 ppb).' The idea proposed is that the high helium ratios are representative of a perfect process that trapped primitive helium soon after the earth was formed. In the case of the lower helium ratios, either a high uranium and thorium environment is implied, or else the diamonds are younger. Younger diamonds would have trapped more evolved or 'aged' helium deep in the upper mantle.

Another observation related to the ^3He contents of the lower ratio diamonds is used as basis for extending the young-old hypothesis even further. Diamonds with lower ratios have significantly lower absolute contents of ^3He. Could it be that the smaller amounts of ^3He reflect a relatively outgassed mantle?

Ozima and Zashu note that the solar-type helium ratios could be due to a different mode of accretion of the earth than the accretionary stages that produced parent bodies of meteorites. Accretionary particles that formed the primordial earth may have been irradiated by intense primitive solar wind. In this hypothesis, meteorites would have trapped only planetary helium.—*MWB*

Monsoon Research

Forecasting monsoons is one of four research areas proposed as part of an expanded program of collaborative projects by U.S. and Indian scientists and engineers, according to George A. Keyworth, II, science adviser to President Reagan and director of the Office of Science and Technology Policy (OSTP). The other proposed research areas are health, agriculture and biomass production, and decentralized electrical power sources.

During the next 6 months, scientists will 'scope out research projects' and detail specific research activities, according to Roger Doyon, head of the Africa and Asia section of the National Science Foundation's (NSF) Directorate for Scientific, Technological, and International Affairs. Most of the actual research will begin with the advent of fiscal 1984.

Research on the long-term variability of monsoons and short-term predictability will be the focuses of the monsoon forecasting effort. India and the United States have agreed to 10 general tasks as part of this program, according to Pam Stephens, associate program director for the Global Atmospheric Research Program within NSF's Division of Atmospheric Sciences. Six of these tasks apply to the long-term variability portion of the research effort:

- develop long-term data records,
- prepare and compile daily records from other areas of the world,
- conduct theoretical and statistical studies to understand monsoons and the global atmospheric and oceanic circulations,
- investigate ocean-atmosphere interactions as they affect monsoons and plan field studies and modeling experiments to take place during the first year of the agreement,
- conduct experiments with general circulation models to explore long-term predictability, and
- obtain ice cores in glaciers to provide proxy data for studies of interannual variability.

J. Shukla of the National Aeronautics and Space Administration's Goddard Laboratory for Atmospheric Science is the program leader.

The remaining four tasks apply to the short-term predictability portion of the bilateral effort on monsoon forecasting:

- develop mathematical models suitable for numerical prediction of monsoons,
- develop systems for acquisition and processing of initial data,
- develop techniques and provide equipment for processing satellite data and for archiving it, and
- conduct basic research on monsoon dynamics.

T. N. Krishnamurti of Florida State University is the program leader.

Monsoon forecasting and the three other research fields were first explored last November during a visit to India by senior U.S. scientists; specific topics were agreed upon by a panel of scientists from both countries following a meeting this past January in India. After the first phase of the program (which will last 18 to 24 months), another set of research projects could be identified for a continuation of the collaborative effort.

In the U.S., overall coordination of the bilateral research will be provided through NSF, while policy guidance will be provided by an interagency committee chaired by Keyworth. A scientific oversight committee at the National Academy of Sciences will recommend participants and will review specific projects. The amount of money each country will contribute has not yet been determined, according to OSTP and NSF.—*BTR*

AGU Awards Announced

AGU has named the 1983 recipients of the Bowie, Bucher, Ewing, Fleming, and Macelwane awards. These distinctive honors recognize AGU members who make significant contributions to geophysical knowledge. All of the awards except the Bucher medal will be presented at a ceremony on Wednesday, June 1, at the AGU Spring Meeting in Baltimore, Md. This year the Bucher Medal will be presented at the AGU Fall Meeting.

AGU is adding to its roster of distinguished awards the Waldo E. Smith Award for extraordinary service to geophysics. The premier award will be made at the 1983 Spring Meeting to AGU Executive Director Emeritus Waldo E. Smith.

The ***William Bowie Medal*** is awarded to ***Syun-iti Akimoto*** for outstanding contributions to fundamental geophysics and for unselfish cooperation in research.

The ***Walter H. Bucher Medal*** is awarded to ***John W. Handin*** for original contributions to the basic knowledge of the earth's crust. The medal is awarded in odd-numbered years.

The ***Maurice Ewing*** medal is awarded to ***Fred Noel Spiess*** for significant original contributions to the understanding of physical, geophysical, and geological processes in the ocean; for significant, original contributions to scientific ocean engineering, technology, and instrumentation; and for outstanding service to marine sciences. The medal is presented jointly by the U.S. Navy and AGU.

The ***John Adam Fleming Medal*** is awarded to ***S. Keith Runcorn*** for original research and technical leadership in geomagnetism, atmospheric electricity, aeronomy, and related sciences. The medal is awarded in odd-numbered years.

The ***James B. Macelwane Award*** is given in recognition of significant contributions to the geophysical sciences by a young scientist of outstanding ability. The recipient must be less than 36 years old. A maximum of three awards can be made each year. This year's recipients are ***Thomas H. Jordan, Donald J. DePaolo, and William L. Chameides.***

The Robert E. Horton Medal for outstanding contributions to the geophysical aspects of hydrology is given in even-numbered years.

A complete list of AGU medal recipients was published in the most recent membership directory (*Eos*, August 31, 1982, p. 664).—*BTR*

Geophysicists

Bruce B. Hanshaw, a specialist in geochemistry and groundwater hydrology, has been appointed assistant director for research at the U.S. Geological Survey (USGS) National Center in Reston, Va. He succeeds ***Robert Wesson***, who has returned to a research position within the USGS. Hanshaw will serve as the principal adviser to the USGS director on major research initiatives and program directions.

Lawrence R. Lyons, of the NOAA Space Environment Laboratory in Boulder, Colo., has accepted a position in the magnetospheric physics branch of the Space Science Laboratory at NASA's Marshall Space Flight Center in Huntsville, Ala.

In Memoriam

Alfred C. Redfield, 92, died on March 17, 1983. An AGU Life Fellow, he joined AGU's Oceanography section in 1947.

Forum

More on Pentagon Funding Ties

Emotional Dependence

Richard Alrock's recent letter on Air Force funding of geophysical research (*Eos*, March 22, 1983, p. 114) raises a number of questions in my mind and I am sure in the minds of many others. Dr. Alrock states that 'funding is determined purely on *relevance*, availability of funds, and our estimate of the quality of the proposed research' (emphasis mine). Relevant to whom? I assume that the Air Force seeks research relevant to its long-range interests which I regard as contrary to the long-range interests of the human race.

Dr. Alrock argues that 'acceptance of financial support from military sources [does not] make individuals and institutions dependent clients of the Pentagon.' Indeed, the Air Force cautions those it supports 'not to become too dependent upon Air Force funds.' But dependence does not necessarily mean financial dependence. The dependence of geophysicists upon the Air Force is more of a moral, or even emotional, dependence. It is difficult to think ill of someone who is giving you money. How bad can the Air Force be if they support my research on synthetic seismograms?

I hope that I shall continue to receive support from nonmilitary sources. One of my great fears is that our society may become so militarized that it will become impossible both to do scientific research and to noncooperate with the military.

Steven H. Emerman
*Dept. of Geological Sciences
Cornell University
Ithaca, NY 14853*

Proposals as Votes

Mr. Alrock is quite correct in pointing out that research scientists with Air Force contracts are not 'clients' of the Pentagon. But he does not deal with a much more important question: does a scientist who solicits funds from a government agency thereby indicate basic approval of this agency's policy? It seems to me that the answer is positive: the more proposals the Pentagon receives, the more it can turn to higher authorities to ask for more funds for those, and the greater its power becomes. Yes, each proposal has only a very small effect, but on election day each ballot has an even smaller one. Each of us must take his/her responsibilities: democracy does not stop after election day.

J.-Cl. De Bremaecker
*Rice University
Houston, TX 77251*

Books

New Publications

Items listed in New Publications can be ordered directly from the publisher; they are not available through AGU.

Atmosphere, Weather and Climate, 4th ed., R. G. Barry and R. J. Chorley, Methuen, New York, xxiv + 407 pp., 1982.

Handbook of Chemical Microscopy, Vol. 1, 4th ed., C. W. Mason, Wiley, New York, xv + 505 pp., 1983, $69.95.

Introduction to Environmental Remote Sensing, 2nd ed., E. C. Barrett and L. F. Curtis, Chapman and Hall, New York, xiv + 352 pp., 1982.

Les Granites Des Complexes Annulaires, B. Bonin, *Manuels et Methodes*, vol. 4, Bureau de recherches geologiques et minieres, Orléans, France, 193 pp., 1982.

Long-Time Prediction in Dynamics, C. W. Horton, Jr., L. E. Reichl, and V. G. Szebehely (Eds.), Wiley, New York, xv + 496 pp., 1983, $85.00.

Mountain Building Processes, K. J. Hsü (Ed.), Academic, New York, x + 263 pp, 1983, $72.50.

On the Performance Property in Spherical Spline Interpolation, by W. Freeden, *Rep. 341*, Department of Geodetic Science and Surveying, Ohio State University, Columbus, v + 88 pp., 1982.

Proceedings of Coastal Structures '83, J. Weggel (Ed.), A Specialty Conference on the Design, Construction, Maintenance, and Performance of Coastal Structures, Am. Soc. Civ. Eng., New York, xiii + 10123 pp., 1983, $76.00.

Random Fields: Analysis and Synthesis, E. Vanmarcke, MIT Press, Cambridge, Mass., xiv + 382 pp., 1983, $45.00.

Theories of Nutation and Polar Motion, 3, H. Moritz, *Rep. 342*, Department of Geodetic Science and Surveying, Ohio State University, Columbus, vii + 116 pp., 1982.

Classified

RATES PER LINE

Positions Wanted: first insertion $1.75, additional insertions $1.50.

Position Available, Services, Supplies, Courses, and Announcements: first insertion $3.50, additional insertions $2.75.

Student Opportunities: first insertion free, additional insertions $1.50.

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Replies to ads with box numbers should be addressed to Box —, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, D. C. 20009.

For further information, call toll free 800-424-2488 or, in the Washington, D. C., area, 462-6903.

POSITIONS AVAILABLE

Agricultural Drainage Engineer. Assistant Professor, tenure track position in the Departments of Land, Air and Water Resources and Agricultural Engineering, 35% teaching and 65% research. Ph.D. in soil physics, agricultural engineering or related field with one degree in engineering with a strong background in flow and solute-water interactions in porous media, mathematical and computer simulation modeling skills, and competence in design and evaluation of agricultural drainage systems.

Teaching responsibilities include advising, instructing undergraduate level course descriptive of soil water flow, solute transport and agricultural drainage systems, and another in drainage system design. At the graduate level, a course in groundwater flow is required. Research in the detailed processes occurring in shallow groundwater is expected to provide management alternatives and drainage design criteria for cropped areas and for drain water reuse.

Applicants should submit curriculum vita, transcripts, statement of research and teaching interests and background in each, copies of publications and manuscripts and the names and addresses of at least three references to: Professor D.R. Nielsen, Chair, Search Committee, Department of Land, Air and Water Resources, 121 Veihmeyer Hall, University of California, Davis, CA 95616, by July 15, 1983.

THE UNIVERSITY OF CALIFORNIA IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER AND INVITES APPLICATIONS FROM ALL QUALIFIED INDIVIDUALS.

Two Tenure Track Faculty Openings in the Coastal and Oceanographic Engineering Department/ University of Florida. Applications are invited for faculty positions in the area of oceanographic engineering. Candidates should have earned a Ph.D. degree with a strong commitment in developing research. Experience in one or more of the following areas is highly desirable: Offshore engineering, marine structure design, materials in marine environment, remote sensing applications and laboratory and numerical modeling of coastal, bay and estuarine environment. Other specialties in coastal and oceanographic engineering will also be considered. Ranks (professor/associate professor/assistant professor) and salaries commensurate with qualifications. Anticipated starting date of August 6, 1983. A detailed resume, academic transcripts and three letters of recommendation should be sent to: Dr. M.K. Ochi, Search Committee Chairman, Coastal and Oceanographic Engineering Department, 336 Weil Hall, University of Florida, Gainesville, FL 32611. Postmark before June 30, 1983 deadline. The University is an equal opportunity/affirmative action employer.

Assistant Professor/University of Alberta. The Department of Physics at the University of Alberta invites applications for a tenure track position at the level of an Assistant Professor in Physics in any of the following areas:

1. Astrophysics and Astronomy;
2. Geophysics (Electromagnetic methods);
3. Theoretical Physics (Medium Energy, Particle Physics, Relativity and Cosmology).

The 1982/83 salary range for an Assistant Professor is $27,720–$39,820 per annum.

Applications will be received until May 1, 1983, and the expected appointment date is July 1, 1983.

The Department of Physics offers both undergraduate and graduate degrees in Physics and Geophysics. The Department currently consists of 47 Faculty Members, 36 Research Associates and Post-Doctoral Fellows and 50 Graduate Students.

Candidates interested in applying should submit a curriculum vitae plus the names of three (3) referees to:

Dr. A. N. Kamal
Chairman
Department of Physics
University of Alberta
Edmonton, Alberta, Canada
T6G 2J1

The University of Alberta is an equal opportunity employer but, in accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

Biometeorology/University of California. The Department of Land, Air, and Water Resources, University of California, Davis, announces a position in the area of biometeorology. Tenure track (11 months) position will be divided 50% teaching and 50% research. The appointment will be at the Assistant or Associate Professor level, depending on qualifications.

QUALIFICATIONS: a ph.d. in atmospheric science or a closely related discipline, with a specialization in the interactions between the atmosphere and the biosphere. Applicants should have teaching and research interests in biometeorology and be able to demonstrate an ability to describe physical/biological systems with experimental and theoretical techniques. The appointee will be expected to direct research activities in biometeorology towards problems important to California agriculture. Teaching may include both undergraduate and graduate courses in biometeorology, undergraduate courses in general areas of atmospheric science, and advising responsibilities.

APPLICANTS: Applicants should submit curriculum vita, transcripts, statement of research and teaching interests and background in each, copies of publications and manuscripts and the names and addresses of at least three references to: R.H. Shaw, Chair, Search Committee, Department of Land, Air and Water Resources, 177 Hoagland Hall, University of California, Davis, CA 95616, no later than June 15, 1983.

THE UNIVERSITY OF CALIFORNIA IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER AND INVITES APPLICATIONS FROM ALL QUALIFIED INDIVIDUALS.

Research Positions for Mathematical Physicists. Applications are invited for several research positions at the Center for Studies of Nonlinear Dynamics, La Jolla Institute, beginning summer 1983. Current research involves work on nonlinear wave-wave interactions, ocean acoustic, optical, and radio wave propagation in random media, and fluctuation phenomena in the statistical mechanics of chemical and geophysical systems. Physicists and applied mathematicians who are interested in working on problems of the above type should send resumes and arrange for three letters of recommendation to be sent to: Dr. Stanley Flatte, Director, CSND, La Jolla Institute, 8950 Villa La Jolla Drive, Suite 2150, La Jolla, California 92037. La Jolla Institute is an equal opportunity/affirmative action employer.

Mesoscale Research Section of the Atmospheric Analysis and Prediction Division (AAP) Ph.D. Scientist I or II (Two Positions). The National Center for Atmospheric Research in Boulder, Colorado is recruiting for Scientist I or II to do basic research studies on small-scale or mesoscale meteorology. The research will be selected and defined in collaboration with the senior staff. The primary emphasis will be in advancing the fundamental understanding of important mesoscale processes and their interactions with smaller scales of motion. Both theoretical and observational studies will be encouraged; the main goal is to improve the skill of mesoscale forecasting.

REQUIRES (LEVEL I):

- Ph.D. dissertation or equivalent research contribution in meteorology or related field
- Demonstrated expertise/interest in small scale or mesoscale meteorology
- Demonstrated skill in effective written and oral communication
- Strong mathematical background

ADDITIONAL REQUIREMENTS (LEVEL II):

- Several years of research experience in mesoscale meteorology or related area
- Publications record reflecting the quality and productivity of past research

Salary range: 82, $25,811—$38,722/year, (LEVEL I) 83, $30,977—$46,465/year, (LEVEL II)

Note: the Scientist I and II appointments are terms of up to three and four years respectively. Individuals may then be appointed to II or III position in accordance with UCAR policy.

Send resume PROMPTLY to Esther Blazon, NCAR, P.O. Box 3000, Boulder, CO 80307, or call (303) 494-5151, Ext. 581 or 666 for information.

Equal Opportunity Employer.

Postdoctoral Position in Physical Oceanography. A postdoctoral appointment in physical oceanography will be available beginning September, 1983 in the College of Marine Studies, University of Delaware, Newark, DE. The initial appointment will be for one year with probable extension for a second year. The salary will be $20,000—$24,000 per year, depending on experience. Funds for the position will be available largely from a grant by NSF for conduct and analysis of a field observational study of the shelfbreak front in the Middle Atlantic Bight.

The person obtaining the appointment would be responsible for a portion of the planning and execution of the field study, much of the subsequent data analysis and interpretation, and teaching of one graduate level course in physical oceanography each year. The successful applicant must have received the Ph.D. in physical oceanography or a closely related field by the starting date of his appointment. Preference will be given to applicants with direct experience in field observations.

To apply send a complete resume and the names of three references to Professor R.W. Garvine, College of Marine Studies, University of Delaware, Newark, DE 19711. (Telephone: 302-738-2169).

The University of Delaware is an equal opportunity/affirmative action employer.

Chairman—Department of Geological Sciences, Wright State University. The Department of Geological Sciences, invites applications for the position of chairman, to be appointed September 1983. We seek a dynamic individual with administrative talent and an appreciation for research and practice-related educational activities. Rank is at the full professor level and no restrictions have been placed on areas of specialization. The department is active with 12 faculty and an emphasis on professional practice, yet maintaining a firm commitment to basic research.

Send a letter of application, curriculum vitae and names of three references to:

Chairman, Search Committee
Department of Geological Sciences
Wright State University
Dayton, OH 45435.

Wright State University is an affirmative action/equal opportunity employer. Closing date for the position is October 31, 1983.

Assistant Research Oceanographer Position. The Center for Coastal Studies, Scripps Institution of Oceanography, has an opening for a physical oceanographer with a general background in nearshore processes with emphasis on field and remote sensing investigations of surface gravity waves.

Incumbent will be expected to conduct field and remote sensing experiments of wave properties, dynamics and climatology in the nearshore environment. Responsibilities will also include design and implementation of surface gravity wave measurements supporting a variety of other nearshore processes investigations.

Minimum qualifications for this position are the Ph.D. degree in oceanography and a demonstrated publication record. Successful candidate should have previous field experience as well as demonstrated expertise in wave propagation theory, array design and data adaptive directional spectrum estimation theory. High levels of skill in oral and written communication are necessary.

Appointment in the University of California system is for 1 or 2 years (renewable) and will be at the Assistant Research I, II, or III level, salary from $22,900-$25,200, commensurate with qualifications. Submit resume, indicating an interest in this specific position together with a minimum of three references, before 4 May 1983, to:

D. L. Inman, Director, Center for Coastal Studies
A-009, Scripps Institution of Oceanography
University of California-San Diego
La Jolla, CA 92093.

SIO/UCSD is an Equal Opportunity/Affirmative Action Employer.

Research Associate/Space Physics. Applications are invited for a research associate to assist in the analysis and interpretation of data from a network of midlatitude magnetometers with special emphasis on geomagnetic pulsation and substorm studies. The position is available September 1983 and is for a period of two years.

Ph.D. and a background in magnetospheric physics required; experience with time-series analysis an advantage.

Send resume, bibliography and the names of three persons from whom recommendations may be obtained to Dr. W.J. Hughes, Astronomy Department, Boston, MA 02215.

Boston University is an affirmative action/equal opportunity employer.

Postdoctoral Research Assistantships/UCLA. The Space Physics Group of UCLA invites applications for a postdoctoral research position which will become available in October 1983. The position entails the analysis and interpretation of magnetometer data in both earth and planetary orbit. Experience in data analysis and the ability to undertake independent research and communicate the results of the research are required. Computer programming experience is highly desirable. Terms of employment and salary to be determined by the qualifications of the applicant. Inquiries should be directed to C.T. Russell, Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90024. Applications should be accompanied by a resume, a complete bibliography and at least two names of references who are well acquainted with the applicant's background and potential. UCLA is an equal opportunity/affirmative action employer.

Research Position/Space Physics. The Space Physics and Astronomy Department at Rice University seeks applicants for one or more full-time research positions within the department. Successful applicant(s) will play key role(s) in the development of theoretical three-dimensional models of the Earth's electromagnetic field. Applicants should have knowledge of, and interest in, at least one of the following areas: solar-wind magnetosphere interactions, magnetosphere-ionosphere coupling, ionosphere-atmosphere coupling, atmospheric electricity. Experience and/or interest in numerical modeling is an important consideration.

Title and salary level commensurate with experience, ranging from one-year Research Associate (renewable in subsequent years depending on performance) to open-ended Research Scientist appointment in the Center for Space Physics. Please send resume and names of three professional references to T. W. Hill or R. A. Wolf, Space Physics and Astronomy Department, Rice University, Houston, TX 77251.

The University is an equal opportunity/affirmative action employer.

Temporary Position: Igneous Petrology and Geophysics/ University of Montana. Applications are invited for one sabbatical replacement at the instructor or assistant professor level for winter and spring quarters of 1983–84 academic year. The period of contract obligation will be approximately January 3, 1984 to June 8, 1984. A graduate student who will have completed a doctorate before September 1983 or anticipates completion sometime during the period of employment would be appropriate for this division.

The Department is looking for someone to teach undergraduate igneous petrology and perhaps a course in geophysics. The average departmental course load per quarter is two courses.

The position is replacing a faculty member on sabbatical and therefore is not permanent or on a tenure track. To apply send a resume and two letters of recommendation to: Arnold J. Silverman, Chairman, Department of Geology, University of Montana, Missoula, MT by May 15, 1983.

The University of Montana is an equal opportunity/affirmative action employer.

Graduate Research Assistantships. The Department of Geology at Sul Ross State University anticipates the availability of graduate research assistantships to students interested in the MS program. Research areas will include: mineralogy, petrology and geochemistry of igneous rocks, structural geology, planetary geology, geochemistry, carbonate petrology and paleoenvironments. Appointments are half-time with a maximum stipend of $5,000 and waiver of out-of-state tuition.

Applicants should submit a letter of application stating research interests along with a transcript and two letters of recommendation to: Dennis Nielson, Chairman, Geology Department, Sul Ross State University, Alpine, TX 79832.

SERVICES, SUPPLIES, COURSES, AND ANNOUNCEMENTS

Calderas and Hydrothermal Systems. Yellowstone National Park, August 22–27, 1983. College credit available. For more information contact: THE YELLOWSTONE INSTITUTE, BOX 515, Yellowstone National Park, WY 82190, (307) 443-0861.

AGU

Membership Applications Received

Applications for membership have been received from the following individuals. The letter after the name denotes the proposed primary section affiliation; the letter A denotes the Atmospheric Sciences section, which was formerly the Meteorology section.

Regular Member

Isa Asudeh (S), Bohdan Balko (O), Jeffery F. Billings (H), Joachim Biro (SM), Charles I. Buckley (H), Pius J. Cagienard (S), Charles F. Capen (P), Woncheol C. Cho (H), Arthur G. Crook (H), Andrew G. Fountain (H), Jacqueline I. Gordon (A), Kenneth E. Heikes (A), Joseph C. Ingari (S), H. G. James (SM), F. J. Kelly (O), Sumant Krishnaswamy (SM), Anthony J. Lawrence (H), Thomas Lyttle (V), David R. Lyzenga (O), Albert Matte (O), Charles Obled (H), Mary T. Osborn (A), D. J. Peterson (S), Rajagopal Raghavan (H), Frank M. Richter (T), Jacqueline A. Richter (O), Sheldon Rosell (O), Mark D. Taylor (H), Albert A. Viggiano (A), Christian C. Weber (T), Eliza I. Wojtaszek (T), Rongsheng Zeng.

Student Member

Paul B. Aldinger (H), Michelle Aparisi (T), David W. Burge (P), Peter T. F. Chia (S), Emeric Faugere (T), Gene Carl Feldman (O), David H. Gancarz (H), Helen M. Hart (A), Joe Hawkins (SM), Lisa A. Heizer (S), G. Henderson (V), Mary McKean Howard (O), Shane F. Ingate, Maureen Kennelly (O), Jongson Kim, Richard H. Kingsley (V), Craig Kletzing, Leslie Anne Landefeld (V), Joel W. Massmann (H), Kris Charles Matson (O), Ellyn M. Murphy (H), Milan M. Obradovic (H), Yoshiharu Omura (SM), Michael A. Simons (O), Kathleen Sullivan (H), Stephen A. Thompson (H), Elizabeth Titus (H), Thomas W. Trull (O), Jonathan Vivanti, Susan Williams (V), Dana Willis (V), Pujitha Ndd Yapa (H), Mindy S. Zimmerman (O).

Associate Member

A. Bailey (H), Tannoy King Walsh (O).

AGU Honors

1983 Medalists and Awardees

Syun-iti Akimoto - Bowie Medal
John W. Handin - Bucher Medal
Fred Noel Spiess - Ewing Medal
S. Keith Runcorn - Fleming Medal
William L. Chameides - Macelwane Award
Donald J. DePaolo - Macelwane Award
Thomas H. Jordan - Macelwane Award
Waldo E. Smith - Waldo E. Smith Award

The 1983 Bucher Medal will be presented to John Handin at the Fall Meeting.

1983 Fellows

Peter L. Bender, Geodesy
Herbert S. Bridge, Solar Planetary Relationships
Marx Brook, Atmospheric Sciences
Harmon Craig, Volcanology, Geochemistry & Petrology
Lynn W. Gelhar, Hydrology
G. V. Gibbs, Volcanology, Geochemistry & Petrology
Dennis E. Hayes, Oceanography
Andrew P. Ingersoll, Planetology
Hugh H. Kieffer, Planetology
Michael W. McElhinny, Geomagnetism & Paleomagnetism
John G. Ramsay, Tectonophysics
Frank M. Richter, Tectonophysics
Jacob Rubin, Hydrology
Edward C. Stone, Solar Planetary Relationships
James R. Wallis, Hydrology

Join in the Festivities

The **Honors Ceremony** will be held in the Francis Scott Key Ballroom of the Baltimore Hilton Hotel at 6:00 P.M. on Wednesday, June 1. All meeting participants are invited and are urged to attend. A **Reception** will follow the ceremony; you can meet and congratulate those being honored and share a glass of sherry with them.

The **President's Dinner** in honor of the medalists, awardees, and Fellows will begin at 8:00 P.M. It is a more lavish and formal affair. Tickets for the dinner are $25 per person. You may order your tickets with your advance registration, purchase them at the meeting, or call AGU toll free at 800-424-2488 (462-6903 in the D.C. area).

Meetings

Program Summary

Union
Satellites & Geosciences, Wed AM
History of Geophysics, Wed AM
Satellites & Geosciences, Wed PM
Test Ban Verification, Thurs AM
Test Ban Verification, Thurs PM

Atmospheric Sciences
Tropospheric Chemistry, Mon PM
El Chichón, Tues AM
Dry Deposition, Tues AM
Stratospheric Chemistry, Tues PM
Ocean/Climate Interactions, Wed PM
New Observing Systems, Thurs AM
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Crustal Movements I, Thurs AM
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Modes & Surface Waves, Mon PM
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SPR: Cosmic Rays
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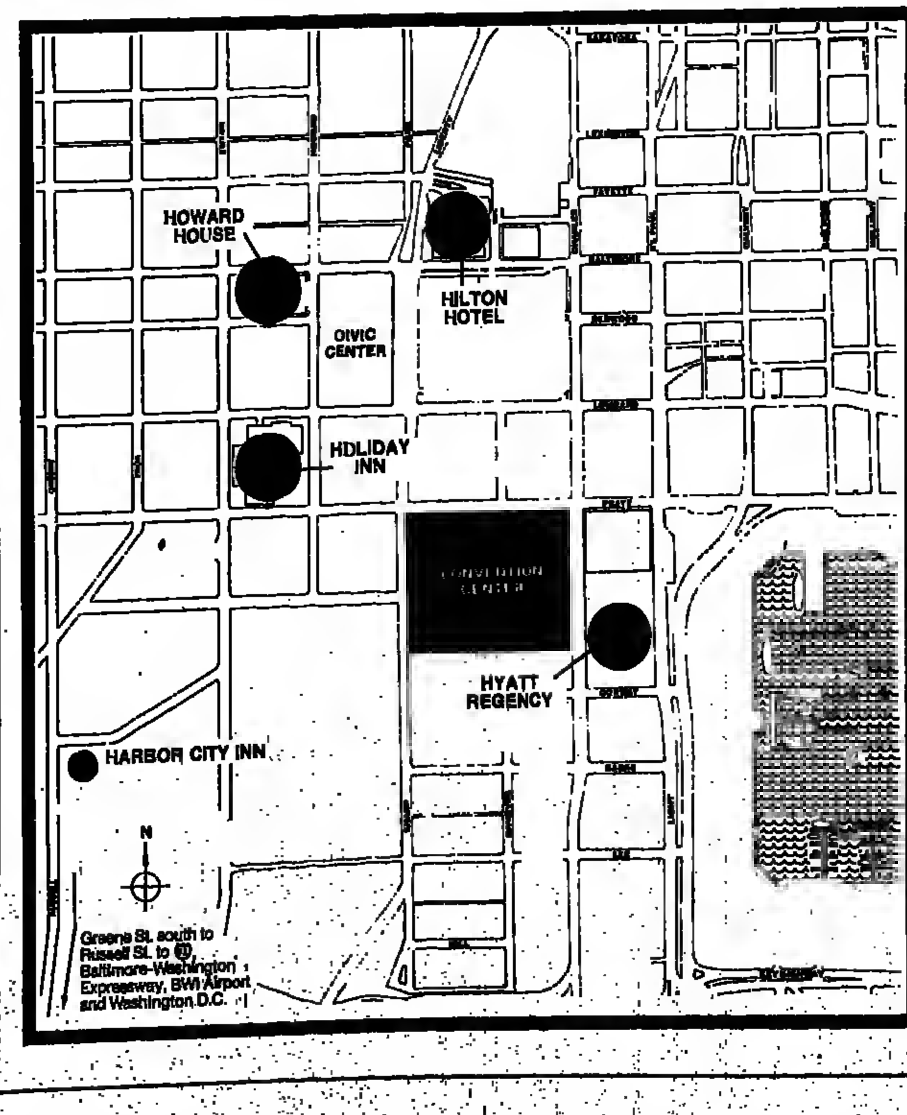
SPR: Magnetospheric Physics
CHAW-6 Results I, Tues AM
Charged Particles I, Tues AM
Waves & Instabilities, Tues AM



EOS

Transactions, American Geophysical Union

The Weekly Newspaper of Geophysics

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Cover. Sails frame Baltimore's Inner Harbor, where new hotels, shops, and promenades and an architecturally striking new national aquarium form one of the nation's most exciting cityscapes. The Baltimore Convention Center, site of the 1983 AGU Spring Meeting, is two blocks from the Inner Harbor. This issue of *Eos* is the last to contain Housing and Meeting Registration forms for the 1983 Spring Meeting. (Cover design by Patricia Banger.)

Tail & Boundary Layer I, Tues PM
Jupiter & Saturn, Tues PM
Numerical Simulation I, Tues PM
CDAW-6 Results II, Tues PM
Aurora & Substorms I, Tues PM
Currents & Fields, Tues PM
Tail & Boundary Layer II, Wed AM
Frontiers of SPR, Wed PM
Numerical Simulation II, Wed PM
Charged Particles II, Thurs AM
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Shocks I, Wed AM
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Paleo-oceanography, Thurs AM
Basins & Seismic Reflection, Thurs PM
Ductile Rock Deformation, Thurs PM
Q & Fluid Interaction, Thurs PM
Mantle Heterogeneities, Fri AM

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Precambrian, Mon PM
Oceanic Basalt, Tues AM
Isotope Geochemistry I, Tues AM
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Xenoliths, Kimberlites, Wed AM
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Mantle Heterogeneities II, Thurs PM
Metamorphic Petrology, Fri AM
Mineralogy & Crystallography, Fri AM

Ahoy! Sail Back Into Baltimore — 1983 AGU SPRING MEETING May 30–June 3

There is still time to mail the housing form to the Baltimore Convention Bureau. Reservations will be accepted on a space availability basis only.

SAVE MONEY . . . Register before May 11
Tickets still available for Section luncheon and President's Dinner

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Plan a Memorial Day weekend holiday in Baltimore — there's lots to do!

Airline, registration, housing material and the session summary were published in EOS, April 12. Contact: AGU Meetings
2000 Florida Avenue, N.W., Washington, D.C. 20009
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1983 AGU Spring Meeting: Housing and Registration Forms—Last Printing!

Ahoy! Sail Back Into Baltimore
for the 1983 AGU Spring Meeting
May 30–June 3

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PARTICIPATING HOTELS	HOTEL CODE	ROOM RATES
Hyatt Regency, 300 Light Street, (301) 528-1234	HRDT	Single: $58.00; Double: $68.00; Twin: $68.00; Extra person: $15.00
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PARKING: Hyatt/$6.00* Hilton/$2.60* Holiday Inn/free Harbor City Inn/free - (location requires car or bus transportation to Convention Center)

* Subject to change.

All hotel reservations must be made on the housing form. Confirmations will be mailed directly to registrants by the individual hotels. After confirmation has been received, changes and cancellations should be made with the hotel directly.

Mail your completed form directly to:
Housing Coordinator
AGU Spring Meeting
Baltimore Housing Bureau
1 East Pratt Street
Baltimore, Maryland 21202

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American Geophysical Union SPRING 1983 MEETING
May 30–June 3, 1983
Baltimore, Maryland

Housing Coordinator
AGU Spring Meeting
Baltimore Housing Bureau
1 East Pratt Street
Baltimore, Maryland 21202

HOUSING APPLICATION FORM

READ CAREFULLY:
Please print or type (pica spaced) all information abbreviating as necessary. Confirmation will be sent by the hotel to the individual named in Part I. If more than one room is required, *this form may be photocopied.*

PART I

REQUESTOR ____ LAST NAME ____ FIRST ____
NAME OF COMPANY OR FIRM ____
STREET ADDRESS OR P.O. BOX NUMBER ____
CITY ____ STATE ____ ZIP/U.S.A. ____
COUNTRY ____ AREA CODE ____ PHONE NUMBER ____

PART II

INSTRUCTIONS: Select *THREE* Hotel/Motels of your choice from the list of participating facilities, then enter the appropriate code letters in the boxes below.

FIRST CHOICE ____ HOTEL CODE — SECOND CHOICE ____ HOTEL CODE — THIRD CHOICE ____ HOTEL CODE

NOTE: Rooms are assigned in "First Come First Serve" order and if none of your choices are available, another facility will be assigned based on a referral system arranged by your convention organizer. A cut-off date is in effect and your application may not be processed if received after 14 days prior to your arrival date.

PART III

INSTRUCTIONS: 1. Select type room desired with arrival and departure dates.
2. *PRINT* or *TYPE* names of *ALL* persons occupying room.
3. If more than two people share a room, check twin and the hotel will assign two double beds.

CHECK ONE		
☐ SINGLE (Room with one bed one person)	Arrival Date: MO DAY	Guest Names (Print Last Name First)
☐ DOUBLE (Room with one bed two persons)	Departure Date: MO DAY	
☐ TWIN (Room with two beds two persons)	Arrival Time: AM PM	
☐ P + 1 (Parlor plus one-bedroom suite)		
☐ P + 2 (Parlor plus two-bedroom suite)		
☐ EXTRA PERSON		

IMPORTANT NOTE: Hotel *MAY* require a deposit or some other form of guaranteed arrival. If so, instructions will be on your confirmation form.

RETURN THIS FORM WITH PAYMENT TO:
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Washington, D.C. 20009

PLEASE PRINT CLEARLY

NAME ON BADGE ____
AFFILIATION ____
MAILING ADDRESS ____
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Days you plan to attend.
☐ Monday ☐ Wednesday ☐ Friday
☐ Tuesday ☐ Thursday
Please check appropriate box.
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Member badges are blue on white.
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ASP-American Society of Photogrammetry
ACSM-American Congress on Surveying and Mapping
UGM-Union Geofisica Mexicana
CGU - Canadian Geophysical Union
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Your receipt will be in your preregistration packet. The registration fee will be refunded if written notice of inability to attend is received in the AGU office by May 26. The program and meeting abstracts will appear in the May 3 issue of *EOS*, which is mailed to all members of AGU in advance of the meeting.

Office Use Reference Number ____

AGU 1983 SPRING MEETING
MAY 30– JUNE 3, 1983
Baltimore, MD.

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MAY 11, 1983

(rates applicable only if received by May 11, with payment)

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PRESIDENT'S DINNER - Wednesday	☐ $25	☐ $25

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☐ Geodesy-Thursday
☐ Geomagnetism and Paleomagnetism-Wednesday
☐ Hydrology-Wednesday
☐ Oceanography-Tuesday
☐ Planetology/Volcanology, Geochemistry and Petrology-Wednesday
☐ Seismology-Wednesday
☐ Tectonophysics-Thursday

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Aeronomy

0460 Tides, waves and winds
FIFTEEN-DAY OBSERVATION OF MESOSPHERIC AND LOWER THERMOSPHERIC MOTIONS WITH THE AID OF THE ARECIBO UHF RADAR
I. Hirota (Geophysical Institute, Kyoto University, Kyoto 606, Japan), T. Maekawa, S. Fukao, K. Fukuyama, M. P. Sulzer, J. L. Fellous, T. Tsuda and S. Kato

An attempt was made to have a continuous observation of the zonal wind component in the tropical mesosphere and lower thermosphere for 15 days of August 1 through 15, 1980, with the aid of the UHF radar at Arecibo (18° N). By using the wind data, together with additional data obtained from meteorological rockets, meteor radar and Tiros-N satellite, analyses were made of the time-mean zonal wind profile, tides, long-period waves and short-period gravity-type waves, respectively. There appears a remarkable day-to-day variation of the zonal wind throughout the region between 70 and 95 km with a characteristic time scale of about 5 days, indicating the passage of travelling planetary-scale waves in the summertime tropical middle atmosphere. It was also found that the short-period oscillation with a time scale of a few ten minutes appears intermittently in association with the strong vertical shear of the background flow. This oscillation is considered to be the manifestation of the Kelvin-Helmholtz type instability in the lower thermosphere. (UHF radar, mesosphere and lower thermosphere, long-period waves, tides, gravity waves).
J. Geophys. Res., Green, Paper 3C0580

0460 Aeronomy
HIGH-LATITUDE STRATOSPHERIC WINDS NEAR 30 KM: VERTICAL, THE DIURNAL AND SEMIDIURNAL POLAR TIDES
N. D'Angelo (Danish Space Research Institute, Lundtoftevej 7, 2800 Lyngby, Denmark), T. Neubert, I. B. Iversen, and H. O. Madsen

A technique for studying winds and tides, at altitudes of approximately 30 km, is the continuous and precise tracking of zero-pressure, stratospheric balloons. The CONSOL navigation system allows tracking of a balloon over the North Atlantic, for two days or longer. Tidal wind data from 14 balloon trajectories (approximately 670 balloon hours) are presented and compared with theoretical predictions. (Winds, tides).
J. Geophys. Res., Green, Paper 3C0401

Exploration Geophysics

0910 Computer applications
CONTINUOUSLY TIME-VARIABLE RECURSIVE DIGITAL BAND-PASS FILTERS FOR SEISMIC SIGNAL PROCESSING
See 0930 Seismic methods
R. A. Stein (Department of Electrical Engineering, University of Calgary, 2500 University Drive N.W., Calgary, Alta., Canada T2N 1N4) & N. Bartley

A design technique is described for continuously time-variable recursive digital band-pass filters for seismic signal processing. Two types of band-pass filters are considered: a cascade of a low-pass and a high-pass filter, and a direct band-pass filter, with all filters being derived from a continuous unit-bandwidth Butterworth low-pass prototype. Linear interpolation of the filter coefficients between points at which they are known exactly is used to reduce the computational overhead. Data are given for determining the length of the interpolation interval to meet prescribed worst case amplitude and frequency error criteria. A zero-phase response is achieved by filtering in the forward time direction followed by filtering in the reverse time direction. An example is included.
GEOPHYSICS, VOL. 48, NO. 6

0920 Magnetic and electrical methods
WERNER DECONVOLUTION FOR AUTOMATED MAGNETIC INTERPRETATION AND ITS REFINEMENT USING MARQUARDT'S INVERSE MODELING
Chao C. Ku (Formerly Aero Service Division, Western Geophysical Company of America, Houston, TX; presently Amoco Production, Houston, TX 77001) John A. Sharp

We present a deconvolution for automated magnetic interpretation based on Werner's (1953) simplified thin-dike assumption which leads to the linearization of complex nonlinear magnetic problems. The usefulness of the method is expanded by the fact that the horizontal gradient of the total field caused by the edge of a thick interface body is equivalent to the total field from a thin dike. Statistical deviation, numerical iteration, and a seven-point operator are used to improve approximations of susceptibility, dip, depth, and horizontal location of the source. Marquardt's nonlinear least squares method for inverse modeling is then used to refine automatically the first approximation provided by the deconvolution. Synthetic and real total-field data are used to demonstrate the process.
GEOPHYSICS, VOL. 48, NO. 6

0930 Seismic methods
REFLECTION OF SPHERICAL SEISMIC WAVES IN ELASTIC LAYERED MEDIA
Paul M. Krail (Getty Oil Company, Research Center Annex, P.O. Box 42214, Houston, TX 77042) Henry Brysk

The solution of the elastic wave equation for a plane wave incident on a plane interface has been known since the turn of the century. For reflections from reasonably shallow beds, however, it is necessary to treat the incident wave as spherical rather than plane. The formalism for expressing spherical wavefronts as contour integrals over plane waves goes back to Sommerfeld (1909) and Weyl (1919). Brekhovskikh (1960) performed a steepest descent evaluation of the integrals to attain analytic results in the acoustic case. We have extended his approach to elastic waves to obtain spherical-wave Zoeppritz coefficients. We illustrate the impact of the curvature correction parametrically (as the velocity and density contrasts and Poisson's ratios are varied). In particular, we examine conditions appropriate to "bright spot" analysis; expectedly, the situation becomes less simple than in the plane-wave limit. The curvature-corrected Zoeppritz coefficients vary more strongly (and in a more complicated manner) with the angle of incidence than do the original ones. The determination of material properties (velocities and densities) from the reflection coefficients is feasible in principle, with exacting prestack processing and interpretation. For orientation, we outline the procedure for the simple case of a separated single source and detector pair over a multilayered horizontal earth.
GEOPHYSICS, VOL. 48, NO. 6

0930 Seismic methods
SEISMIC SHEAR-WAVE OBSERVATIONS IN A PHYSICAL MODEL EXPERIMENT
Robert D. Tatham (Getty-Gay Geophysical, P.O. Box 36306, Houston, TX 77036) Donald V. Goolsbee, Wulf F. Massell, and H. Roice Nelson

The observation and common-depth-point (CDP) processing of mode-converted shear waves is demonstrated for real data collected in a physical model experiment. The model, submerged in water, represented water depth scaled to 250 ft, the first subsea reflector at 4000 ft, and the last reflector at 7000 ft below the sea floor with a structural wedge at the center. Very efficient mode conversion, from P to SV and back to P, is anticipated for angles of incidence at the liquid-solid interface (sea floor) between 35 to 50 degrees.

The model, constructed of Plexiglas and 3180 resin, will support elastic shear-wave propagation. One anticipated problem, internal reflections from the sides of the model, was solved by tapering the sides of the model to 45 degrees off vertical. The P wave reflection coefficient at an interface between Plexiglas and water is 35 percent for vertical incidence, but it diminishes to very nearly zero between 43 and 71 degrees. Thus, by tapering the sides of the model, any undesired internal P wave reflections had to undergo at least two reflections at angles of incidence in the low reflection coefficient range for P waves.

Data were collected in both an end-on CDP mode, with offsets from 1000 ft to 10,000 ft, and a variety of walk-away experiments with scaled ranges from 1000 ft to 31,000 ft. Processing and analysis of the data confirm the existence of mode-converted shear-wave reflections in a modeled marine environment. In particular, the S wave reflections from all interfaces are identified on both the 100 percent gathered records and the final stacked records. These SV wave reflections were isolated for stacking by considering those portions of the gathered records, both offset and arrival time, that correspond to optimum angles of incidence. In addition, τ-p processing isolated particular angles of incidence, further confirming the incidence angle-range criterion. Thus, the desired events are unambiguously identified as mode-converted shear waves.
GEOPHYSICS, VOL. 48, NO. 6

0999 General or miscellaneous
COMPOSITE COLOR IMAGES OF AERIAL GAMMA-RAY SPECTROMETRIC DATA
Joseph S. Duval (U.S. Geological Survey, Box 25046, MS 964, Denver Federal Center, Denver, CO 80225)

Aerial gamma-ray data provide estimates of the apparent surface concentrations of potassium (K), equivalent uranium (eU), and equivalent thorium (eTh). These data can be expressed as nine radiometric parameters: K, eU, eTh, eU/eTh, eU/K, eTh/K, eTh/eU, K/eU, and K/eTh. The U.S. Geological Survey (USGS) has developed a technique which combines any three of these parameters to form a composite color image. The color image provides a partial synthesis of the radiometric data that can be used to aid geologic mapping and mineral exploration. The sample data set, from the Freer area in south Texas, illustrates the use of the color images.
GEOPHYSICS, VOL. 48, NO. 6

Geodesy and Gravity

1935 Low-order harmonics of the gravity potential field
THE ACCURACY OF THE LOW DEGREE GEOPOTENTIAL: IMPLICATIONS FOR OCEAN DYNAMICS
C. A. Wagner (National Geodetic Survey, National Ocean Service, NOAA, Rockville, Maryland 20852)

The low-degree portion of a number of recent global gravitational fields have been tested for accuracy using precise accelerations measured on 24-hour satellites. These measurements are independent of the data in the field models. The results show that the most accurate of the recent solutions have degree error variances significantly less than 10 cm (geoid height equivalent) for all degrees less than five. Thus the lasting features of ocean circulation should now be visible when comparing the geoid computed from this model with the average sea surface computed from satellite altimetry. However, before accurate mapping is possible, the equivalent accuracy of the mean altimetric surface at long wavelengths needs to be verified.
J. Geophys. Res., Red, Paper 3B0414

1999 General or miscellaneous
COMPACT GRAVITY INVERSION
B. J. Last (Formerly International Institute for Aerial Survey and Earth Sciences (ITC), Delft, The Netherlands; presently Watts, Griffis and McOuat (Saudi Arabia) Ltd., P.O. Box 5219, Jeddah 21422, Saudi Arabia) & Kubik

We present a new criterion for the inversion of gravity data. The principle employed is to minimize the volume of the causative body, which is equivalent to maximizing its compactness. The anomalous density distribution is obtained using an iterative technique which is numerically stable and rapidly convergent. The principle can also be adapted to include modeling of gravity anomalies by single-density sources.

The advantage of this approach is that desirable geologic characteristics are automatically incorporated into the model with a minimum of subjective judgments on the part of the interpreter.

The treatment of noise in the data fits naturally into the formulation of the inversion procedure.

The method is illustrated by the inversion of noise-free and noisy data generated from a two-dimensional model consisting of a regular array of identical rectangular blocks whose densities can be individually specified. In every case the algorithm successfully recovers the correct density distribution from the data. In the case of noise-contaminated data, a complete separation of the noise from the signal is achieved.

The practical effectiveness of the method is demonstrated by the inversion of published gravity data. The results obtained are compared with existing models and with available drilling information.
GEOPHYSICS, VOL. 48, NO. 6

Physics of the Solid Earth
Volume 18, Number 7

Physics of the Solid Earth

Volume 18, Number 8

SCIENTIFIC COMMUNICATIONS

CHRONICLE

OBITUARY

Hydrology

3125 Hsdrology
THE FORMATION OF ANTARCTIC ICEBERGS TO OCEAN WAVES
Peter Wadhams, Monica Kristensen (SCOAT Polar Research Institute, University of Cambridge, Cambridge CB2 1ER, England) and Olav Orheim (Norsk Polarinstitutt, PO Box 1963, 1330 Oslo Lufthavn, Norway).

During a 1980-81 cruise of HMS "Endurance" to the South Atlantic. The three icebergs, located in the area south Sandwich and South Orkney Islands, were instrumented with accelerometers, rollimeters and wire strainmeters, while a wavemeter buoy was used to record the ocean wave field. The thickness of the icebergs was surveyed by a helicopter-borne radio echo sounder. The heave response occurred mainly at the local period, but with outbreaks of bobbing which lasted for a few cycles at a near-constant period (about 20 s) which agreed well with the predictions of a numerical finite element model. The roll response occurred mainly at a long resonant period (80-90 s) which again agreed well with the model, but there was also a significant response at ocean wave period (4-15 s) which exceeded predictions. The surge-sway response had a component at very long periods which is unexplained by theory, while the antenna stress at ocean wave periods agreed with the simple analytical model of Goodman et al (1980). Using this model it is possible to predict wave heights and period which will cause breakup of the icebergs, and we conclude that swell-induced breakup is likely to occur during major storms in the open Southern Ocean.
(Keywords: ocean waves, Southern Ocean, floating bodies).

J. Geophys. Res., Ocean, Paper 3C0570

3130 Snow and Ice
SOME METEOROLOGICAL APPLICATIONS OF RADIOACTIVE FALLOUT
MEASUREMENTS IN ANTARCTIC SNOWS
E. Pourchet (Laboratoire de Glaciologie et Géophysique de l'Environnement-CNRS, 2, rue Très-Cloîtres, 38031 Grenoble-Cedex), P. Pinglot and C. Lorius

Radioactive fallout, generally performed to determine average snow accumulation rates, can also be used to determine other meteorological informations. The following results were obtained from measurements on the Antarctic ice sheet :

a) a steadyspheric residence time of 1.5 years for stratospheric such as 90Sr and 137 Cs.

b) a value of approximately 1 for the ratio r between the concentration measured in the air (pCi/m3) and the concentration determined in the snow (pCi/l), with extreme values of 0.8 and 3.

c) the dry fallout represents between 15 and 18 % of the total deposition in the coastal regions and as much as 40 to 60 % in the central domes.

d) precipitation increase of 38 % observed after 1965 when compared with the decade 1955-1965.

J. Geophys. Res., Ocean, Paper 3C0569

Meteorology

3120 Meteorology
HIMALAYA-WIDE SNOW COVER AREA AND RUNOFF MODELS
A. Rango and G.E.Hall, Remote Sensing Institute, Department of Geology and Geography, Howard University, Washington, D. C. 20059.

The study presented in this paper examines the relationship between satellite derived Himalayan snow cover extent and surface runoff. Snow cover for March and April in 1974 to 1976, obtained from visible and near infrared Imagery from satellite Nimbus and Landsat backgrounds were combined with snow cover data produced by the NOAA-NESS Indian summer monsoon rainfall was the area-weighted mean of all rain-gauge stations. The variations of Indian summer monsoon rainfall were correlated with that of the Himalayan winter snow cover area. There is an inverse relationship between these two parameters which indicates that more than normal Himalayan winter snow cover area is to be followed by less than normal Indian summer monsoon rainfall over India. The inverse relationship is explained in terms of the heat budget of the Himalayan snow cover area. Departures from long-term mean air temperature and the snowline elevation on the Himalayas are found to be significant in the regression between the snowline elevation and the rainfall departures.

J. Geophys. Res., Atmos, Paper 3C0589

1799 General (Ocean Transport)
A SEMIGEOSTATIC MODEL OF EULERIAN, LAGRANGIAN-MEAN, AND LAGRANGIAN OCEANIC TRANSPORT IN STEADY PLANETARY WAVES
Richard B. Rood (NASA/Goddard Space Flight Center, Code 910, Greenbelt, MD 20811) and Mark E. Schoeberl

Ozone transport is calculated for steady, dissipative planetary waves using the Eulerian, Lagrangian-mean, and residual circulations. The Lagrangian model of parcel dynamics is used to determine Lagrangian-mean and residual circulations. Ozone is chemically active regions the mean field changes are found to be significant only where there are large gradients in the chemical sources and sinks along parcel trajectories. The largest changes in the mean field are found in the lower stratosphere and are due to the Lagrangian-mean advection. When the Lagrangian-mean advection is approximated by the residual circulation, errors in the transport calculation as large as 30% may occur.

J. Geophys. Res., Ocean, Paper 3C0641

Particles and Fields—Ionosphere

5181 Aurorae
THE EXTREME ULTRAVIOLET SPECTRUM OF DAYSIDE AND NIGHTSIDE AURORAE 800-1400 Å
D. Paraeson, S. Chakrabarti, S. Bowyer and S. Sivkin (Space Sciences Laboratory, University of California, Berkeley, California 94720).

Satellite observations of the auroral emission spectrum between 800 and 1400 Å at 8 Å resolution are presented. The spectrum is dominated by lines of neutral emission. A number of bright lines, most notably O I^, 135, and the O I, 989 and 1026 Å features, are detectable at all zenith angles sampled by the spectrometer (30-150°). The day auroral spectrum is dominated by atomic oxygen and nitrogen line emissions. The N I, 1134 Å Lyman alpha line is a prominent feature of many of the night and day auroral events.

J. Geophys. Res., Mius, Paper 1A1933

5520 Electric fields
A FIRST COMPARISON OF STARE AND EISCAT ELECTRON DRIFT VELOCITY MEASUREMENTS
K. Hielen (Max-Planck-Institut für Aeronomie, 3411 Katlenburg-Lindau, FRG), K. Schlegel

The Scandinavian twin auroral radar experiment (Stare) has a demonstrated capability of providing estimates of the ionospheric electron drift velocities, which are useful for a wide range of geophysical studies. Accuracy of such estimates has for the first time been tested by comparison with simultaneous EISCAT facility (Kiruna) measurements. The magnitudes of the two derived drift velocities are in agreement with the EISCAT measurements for small velocities (< 200 m/s), but at the latter's during the passage of the ionospheric shock the velocities become larger. The directions of the estimated vectors are in agreement with the EISCAT measurements, for all drift magnitudes. The measured phase velocities are even lower than those predicted by the simple theory of the two stream instability. Agreement can only be obtained for unrealistically large electron densities. The data are not inconclusive with an assumption that the possible phase velocities in the plasma are limited upward by the ion-acoustic velocity (which is an increasing function of the ionospheric electron field). Four special observations and an improved modelling with the kinetic theory indicate that a backscatter region, extended in altitude and aligning to an improved theoretical fit to the measurements, (Plasma instabilities, wave propagation, instruments and techniques)

J. Geophys. Res., Mius, Paper 3A0589

5545 Ionospheric disturbances
THE MORPHOLOGY OF A MULTI-BUBBLE SYSTEM IN THE IONOSPHERE
J. Chen, P. Satyanarayana, and O.L. Osenkov (Plasma Physics Division, Code 4780, Naval Research Laboratory, Washington, D.C. 20375)

A multi-bubble model is developed to study the morphology of a finite array of plasma density depletions (bubbles) in the context of equatorial F-region irregularities during spread F. The Poisson transport conservation equation with quasi-neutrality is solved analytically using an electrostatic analogy. The solution is exact with no a priori assumption regarding the separation distance. A two-bubble system with a piecewise constant density profile is first analyzed and the technique is then applied to multi-bubble systems to calculate the polarization electric field and the rise velocities. As a function of the half-distance of the neighboring bubbles is obtained in the light of the field line resonance theory. The profile of the vacuum region is described; the polarization of the pulsating fields is defined and the harmonic index of the standing wave is identified. The phase difference between the electrostatic and ionospheric signals allows the identification of the spacecraft instant magnetic latitude. Simultaneous, electric fields, field line resonance, conjugate measurements).

J. Geophys. Res., Mius, Paper 1A0572

5560 Wave propagation
IONOSCSERIC SCINTILLATIONS
B. M. Wu and N. Marcuvitz (Microwave Research Institute, Polytechnic Institute of New York, Farmingdale, New York 11735)

A coarse-realization technique, employed in the spirit of the formal theory of scattering, is applied to the problem of ionospheric scintillation. In the forward scattering limit, using a Markov approximation for ionospheric fluctuations and Gaussian-distributed moment equations, one derives the wave statistics for a plane wave or beam propagating through the ionosphere. Fluctuations in the line of sight amplitude as well as the intensity power spectrum. Peaks superposed on a power law spectrum are found to increase the scintillation index. A field of a focusing X-band is observed in the Alcock scintillation limit. An experimental power spectrum, obtained from in situ measurements by the Explorer-6 satellite and correspondingto electron density fluctuations of 20%, is used to calculate the S4 for night time equatorial scintillations. For an ionospheric slab model at 280 km thick at an altitude of 380 km numerical calculations yield an S4 of about 1.1, in approximate agreement with measurements of theou.

Rad. Sci., Paper 3S8408

5585 X Rays, Gamma Rays, and Cosmic Rays
FEATURES HIGH ENERGY SPECTRA AT SEVEN DIFFERENT EPOCHS IN THE ATMOSPHERE FROM 0 TO 4.0 MEAN WEAR THE GEOMAGNETIC EQUATOR.
P.L. SEAST (Physical Research Laboratory, Ahmedabad 380 009/India).

Atmospheric neutrons 8 to 220 MeV are studied. Seaven differentiated energy spectra and integrated spectra at 0, 4, 8, 10, and 40 shar are given. Spectra for 2 to 10 MeV are given for 7 different altitudes. All spectra show maxima near 40 MeV and large drops near 22 and 100 MeV energies. Data are discussed. Our results at z = 7.8 are compared with other mean z = 6.9 both theoretical and experimental. Explanations are offered for the different spectral features and the natural shape of the neutron energy spectra. (Atmospheric neutron energy spectra).

J. Geophys. Res., Mius, Paper 1A1858

5590 Instruments and Techniques
FIRST BISTATIC OBLIQUE-INCIDENCE IONOGRAMS
REVIEW DIGITAL IONOSONDES
I.W. Wright (Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, Colorado 80309), K.L. Bressman

Identical digital ionosondes (transmitter in Boulder and receiver in Table Mesa, 88m km distance, were synchronized with rubidium frequency and time standards. Bistatic ionograms were obtained for the first time. Accuracy of such estimates has for the first time been tested by comparison with simultaneous EISCAT facility (Kiruna) measurements. The magnitudes of the two derived drift velocities are in agreement with the EISCAT measurements for small velocities (< 200 m/s), but at the latter's during the passage of the ionospheric shock the velocities become larger. The directions of the estimated vectors are in agreement with the EISCAT measurements, for all drift magnitudes. The measured phase velocities are even lower than those predicted by the simple theory of the two stream instability. Agreement can only be obtained for unrealistically large electron densities. The data are not inconclusive with an assumption that the possible phase velocities in the plasma are limited upward by the ion-acoustic velocity (which is an increasing function of the ionospheric electron field). Four special observations and an improved modelling with the kinetic theory indicate that a backscatter region, extended in altitude and aligning to an improved theoretical fit to the measurements, (Plasma instabilities, wave propagation, instruments and techniques)

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J. Geophys. Res., Mius, Paper 1A0572

5560 Wave Propagation)
COHERENCE OBSERVATIONS OF VCS ELECTRIC FIELD WITH A GEOSTATIONARY SATELLITE AND A GROUND RADAR FACILITY
G. Crowd (Space Science Department of ESA/ESTEC, Noordwijk, Netherlands) and

Rotating electric fields in the VCS frequency range

6510 Atmosphere of Planets
THE POLARIMETRY OF SATURN AT 2640 AND 7500 A
PHOTOMETRY AND POLARIMETRY OF SATURN AT 2640 AND 7500 A OBSERVED by the Voyager 2 ultraviolet spectrometer experiment. Spatially resolved limb photopolarimeter experiment. Spatially resolved limb photometer scans across Saturn's Equatorial zone to-terminator scans across the illuminated face from 15° to 68° phase angle provides information on the altitude distribution of uv absorbing haze, and the phase function and polarizing properties of surface and aerosol and tropospheric aerosols. Limb-to-terminator scans across the northern hemisphere at three wavelengths are used to study latitudinal variations of the upper aerosol cloud at several latitudes.

For the Equatorial Zone we find (1) the uv photometry and polarization can best fit by Rayleigh's phase function (2) a strictlyspheric haze of small particles is required to explain the observations, (3) the scattering optical depth of the haze layer is in the 0.5 to 1.0 range, (4) the center of the haze layer is in the 50 to 70 mbr region. A diffuse haze fit is better than a thin or under-dense haze. The particle distribution and optical depth of the haze differ significantly from models proposed by others. To be in agreement with ground based and other spacecraft data, the haze optical depth it about 0.4 at 2640Å and decreases by a factor of 10 larger than observed. If the haze is composed of spheres or more it 2640Å. If the haze is composed of spheres with radii similar to those for spheres with mean radius of 0.1 μm, their imaginary refractive index is 0.4 or larger at 2640Å and 0.1 at 7500Å. The single scattering albedo in the North Equatorial Belt is ω = 0.967. The Equatorial Zone tropospheric aerosols are positively polarizing at all the phase angles of our observations.

J. Geophys. Res., Ocean, Paper 3C0541

6610 General (Planetary Rings)
COSMIC FORCES ON THE DUST IN JUPITER'S RING
G. J. Gostalmago (Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139)

A numerical integration program was developed to follow the paths of dust particles in the Jovian ring, including the accelerations due to gravity, and the Lorentz and drag accelerations. The orbits of the 2.5 micron radius, spherical dust particles of density ρ = 2.5 gm/cm3 that escape from the Amalthea ring are followed to -10V until become significantly perturbed. The particles are released backwards near 128.65° longitude (where the longitudinal component of the Jovian magnetic field is strongest) at the maximum excursion of Amalthea's orbit relative to the equator (i = 0.4 degrees, constrained with a distance of 220 km above the equatorial plane. This distance is more than an order of magnitude larger than the observed vertical limits to the half-thickness of the ring. Either the particles are larger, or the voltages on them less, than what has been inferred by previous workers. The dust in the ring may be considerably cooler than was estimated. Particles of 0.3 microns with -10V potentials, starting at before in circular orbits near the outer edge of the ring (1.18 RJ), are spread from 1.68 to 1.98 RJ and inclined up to 7 degrees out of the equatorial plane. Their paths do not follow Keplerian orbits, and particle positions are not symmetric about the equatorial plane. Particles of 0.4 micron radius show much less asymmetry in their orbits than the 0.3 micron particles, while particles of 0.2 microns or less are perturbed into the Jupiter atmosphere within a few tens of hours. (Rings, Jupiter magnetosphere, dust).

J. Geophys. Res., Mius, Paper 1A0687

Seismology

6840 Phenomena related to earthquake prediction
PRECISE MEASUREMENT OF SEISMIC TRAVELTIMES - INVESTIGATION OF VARIATION FROM TIDAL STRESS IN BALDCK CRUST
G. O. Bolt (Geological Survey, Menlo Park, California, 94025), R. E. Westerlund and T. S. Fletcher

We have conducted 8 precise seismic surveys near Willow, CA, over a period of 1 y to an attempt to detect the tidal stress variations caused by the earth-tide phases and a deeper, lait-headed circularly polarized wave on the trailing edge of the shock. Analysis of the initial portion of the first arrival in the interaction is important in locating the phase. Spectrum escape of particles results in a rapid broadening of the shock profile. The implications of the simulation results to magnetic sweeping processes in the neighborhood of an x-type neutral point are described.

J. Geophys. Res., Mius, Paper 3A0523

5795 General
PARADIGM TRANSITION IN COSMIC PLASMA PHYSICS
E. Alfven (Electrical Engineering & Computer Sciences Department, University of California, San Diego, La Jolla, CA 93093)

During the 1970's in situ measurements in the magnetospheres, including the solar wind region ("solar magnetosphere") drastically changed our understanding of the properties of cosmic plasma.

Further, we have learned how to generalize results from plasma investigations in one region to other regions. This means that laboratory investigations of plasma of the size of, say, 10 cm can be used to achieve better understanding of cosmic phenomena of magnetospheric dimensions; say, 10^12 cm. By scaling of as much as 10^11 we can study cosmic magnetospheric results in galactic plasma of, say, 10^23 cm. A third jump of 10^7 brings us up to the Hubble distance 10^28 cm and hence to cosmological problems.

Geophys. Res. lett., Paper 3L0422

5799 General
ON THE STRUCTURE OF THE MAGNETIC SLOW SHOCK-OFF BOUNDARY
O. W. Swift (Geophysical Institute, University of Alaska, Fairbanks, Alaska, 99701)

The structure of the magnetic slow shock-off boundary is examined in detail. The initial state is the collapse plasma related by the Rankine-Hugoniot conditions and expressed by a transition layer of ion gyroradii thick. The code follows the evolution of the system in time. Two principal features of the results are the formation of a sharp, well-defined plasma and a deeper, lait-headed circularly polarized wave on the trailing edge of the shock. Analysis of the initial portion of the first arrival in the interaction is important in locating the phase. Spectrum escape of particles results in a rapid broadening of the shock profile. The implications of the simulation results to magnetic sweeping processes in the neighborhood of an x-type neutral point are described.

J. Geophys. Res., Mius, Paper 3A0523

5799 General (Spacecraft Charging)
OBSERVATIONS OF CHARGING DYNAMICS
R. C. Olsen (Physics Department, University of Alabama in Huntsville, Huntsville, Alabama 35899), C. K. Purvis

Plasma data from the UCSD Aerotrat Particles Experiments on Applied Technology Satellites 5 and 6 are used to investigate the dynamics of natural charging events. Both eclipse and daylight charging events are considered, and the observations are related to data from specific events. Two different physical processes are found to be involved in the charging dynamics. One of these is relatively independent of the spacecraft structure potential responds rapidly to changes in the environment, typically changing by hundreds of volts in a few seconds. The other process is more subtle: differential charging and potential barrier formation by secondary electrons can be established in the tens scale, typically tens of minutes are required for the potential to change by several hundreds of volts. The latter process is found to be principally responsible for daylight charging on both spacecraft.

J. Geophys. Res., Mius, Paper 3A0578

Planetology

6810 Atmospheres of Planets
VOYAGER ULTRAVIOLET PHOTOPOLARIMETER OBSERVATIONS OF TITAN
R.A. West (Jet Propulsion Laboratory), D.L. Coffeen and D.E. Shemansky (Department of Atmospheric and Space Physics, University of Colorado, Campus Box 391, Boulder, CO 80309), A.L. Lane, W. Hord, R.T. Stewart, C.W. Hord, B.L. Barth, L.E. Esposito, M. Sato and G.E. Pomphrey

Observations of Titan's whole disk polarization at 2640 and 7580 Å are presented and analyzed in terms of single scattering atmospheres. If the Titan aerosols are spherical or nearly spherical, no single combination of refractive index and size distribution is able to fit data at both wavelengths. A vertically inhomogeneous model atmosphere suggested by Tomasko and Smith, characterized by a size gradient with altitude, fits the data at 2640 Å moderately well but must be modified at intermediate and large optical depths to fit the 7580 Å data. Results for synthetic phase functions indicate that the single scattering polarization of sunlight by Titan's aerosols will be 5% or larger in the near-IR at 90° phase angle, depending on the phase function. If the correct phase function is similar to that for 0.6 μm radius spheres, the single scattered polarization must be 8%, or even 20% if single scattered polarization must be over 5%. Such large polarizations are impossible for Rayleigh scatterers, but may be possible for nonspherical particles with effective radii near 0.5 μm if either the existence of nonspherical particles with the scattering properties required by these and other observations has not been demonstrated.

J. Geophys. Res., Ocean, Paper 3C0540

for changes which may be precursors to earthquakes, then awareness of detection related changes and negative results which avoid those changes are essential for meaningful results. (Detection, Situational).

J. Geophys. Res., Sch, Paper 3B0279

Social Sciences

1399 General (Social Sciences)
RESERVOIR MANAGEMENT: A RELIABILITY PROGRAMMING APPROACH
Miguel A. Marino (Department of Land, Air and Water Resources and Department of Civil Engineering, University of California, Davis, California 95616) and Behnad Mohammadi

A reliability programming model is developed to determine the optimum monthly releases from a multipurpose reservoir. The model is based on chance-constrained linear programming (CCLP) and dynamic programming (DP). The flood and drought reliabilities are represented in the CCLP in the form of chance constraints. These reliabilities are varied parametrically from their maximum required levels at their minimum possible values. The tradeoffs between flood and drought reliabilities are made using a forward two-dimensional DP routine. Operating rules are developed for flood and/or drought reliabilities during the year. Folsom reservoir of the California Central Valley Project is used to demonstrate the use of this reliability programming approach. The resulting operation policy shows high reliabilities of flood and drought during winter and summer months, respectively. The variable risk levels avoid unnecessary releases during summer (for flood protection) and unnecessary storages of water during winter (for drought protection).

Water Resour. Res., Paper 3W0119

Solar Physics, Astrophysics, and Astronomy

7130 Electromagnetic radiation
Solar Variability in the Spectral Range 3100-3180 Å
L. A. Hall (Air Force Geophysics Laboratory, Sedford, Massachusetts, 01731)

Between April 1917 and April 1981, four balloon flights of a solar ultraviolet spectrometer were made to altitudes near 28 km in the stratosphere. Analysis of these measurements shows that the solar irradiance in the wavelength range 2350-2870 Å has been constant within ± 1% over this period. The central emission cores of the Mg II resonance lines increased in intensity by about 28% over the same time period. (Solar ultraviolet irradiance, stratosphere).

J. Geophys. Res., Ocean, Paper 3C0573

Tectonophysics

8130 Heat flow (Extensional Basins)
EVOLUTION OF THE PANNONIAN BASIN SYSTEM
2. SUBSIDENCE AND THERMAL HISTORY
Ronald P. Lowell (Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139 and Department of Geological Sciences, Harvard University, Cambridge, Massachusetts 02138), F. Horvath (Geophysical Department, Eötvös University, Kun Béla ter 1, H-1083 Budapest, Hungary), A. Magyarosy (Geological Department, Eötvös University, Museum krt 4/6, H-1088 Budapest, Hungary), and L. Stegena (Cartographic Department, Eötvös University, Kun Béla ter 1, H-1083 Budapest, Hungary)

Analysis of sedimentation and thermal data indicates that the deeper parts of the Pannonian basin, observed heat flow, rates of thermal subsidence and vitrinite reflectance are consistent with the model of Lowell and Genik (1972) for basin formation in intracontinental extensional regions. A simplified extension model for basin formation in late Miocene time, and could also account for the amount of uplift observed during extension. Crustal extension beneath most parts of the basin is estimated to have been about 60% to 100%. On the basis of available heat flow and thermal data, the Vienna basin has been interpreted as the result of thin-skinned extensional tectonics above a shallow detachment within the upper crust. Analysis of thermal and subsidence data from the northern Pannonian basin suggests that little or no heating occurred in the Cretaceous sediments. These data are consistent with a thin-skinned extensional origin for the Vienna basin. This study emphasizes the need for good thermal control in order to use basin subsidence reconstructions of extensional and thermal histories of sedimentary basins. Where such data are available, it is found that a simple uniform extension model does not explain very well the evolution of most sedimentary basins, such as the Vienna and Pannonian basins. In the basins, each set of faults is thought to be the result of a single movement during the late Miocene. Geophysics 600 m apart were digitized at a nominal rate of 600 samples/s by two cassette recorders modified for precise synchronization. Each recorder was placed over a water stock. Each group consists of ~180 travel-time measurements over the 12 h period between 5 p.m. and 5 a.m. local time. The travel time of each measurement was limited by daytime cultural noise. Analysis of the station variation is done either by fitting of amplitude maxima to a theoretical correlation of a waveform constructed from the digital data by a cubic-spline interpolation. Fractional error of the repeatability of travel-time measurements is typically ~2.5 x 10^-4 for the first high-frequency, large-amplitude arrival following the station. The variable risk levels avoid unnecessary releases during summer (for flood protection) and unnecessary storages of water during winter (for drought protection).

Water Resour. Res., Paper 3W0119

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Water Resour. Res., Paper 3W0119

8138 Tectonophysics (Plate Tectonics)
DEVELOPMENT OF FOREARCS OF INTRASEISMIC SUBDUCTION ZONES
Dall Lundberg (Earth Sciences Board, University of California, Santa Cruz, California 95064)

The uplifted Costa Rican forearc landward of the Middle America Trench and the Eastern forearc drilled on DSDP Leg 66 both lack the thick fill, massive, coarse sedimentation, and abundant evidence of basinal subsidence that are widely known forearcs of the Aleutian and Japan trenches. Forearc sediments contain significant admixtures of pelagic and hemipelagic sediments in place at thick trench and transit slope intervals of convergence and subduction. The Nicoya Peninsula of Costa Rica contains no significant melange terranes. Deformation of the active igneous forearc of Nicaragua is thin cover of volcanic, hemipelagic, and first-cycle volcanogenic material is still emerald, with discernible areas of intense deformation and tectonic melange. Intermediate stratigraphic sections, interconnected by seismic reflection profiles, are used to analyze the processes leading longitudinal trench-parallel variations of lithic or textural maturity of sediments, and sizes of lithic or textural maturity of sediments, and recently suggested experimental and theoretical models of subduction zone processes involving flow melanges are inappropriate for intraoceanic forearcs. Intraoceanic forearcs generally lack high-grade schistose components such as blueschist and eclogite. Components such as blueschist and eclogite. Components are interpreted as blocks in lesser-grade metamorphic matrix and broken formation of the Western Cascades, Washington and Oregon, and the Franciscan Complex of California. Broken formation and melange are subduction zone processes involving flow melanges of sediments in the trench and trench slope. Terranes, Paper 3T0113

8130 Plate Kinematics
A SEISMIC GAP ALONG AN ACCRETING PLATE BOUNDARY
EVIDENCE FOR THE DJIBOUTI RIFTING EPISODE, AFAR, EAST AFRICA
J.C. Rouzet and J.C. Lépine (Laboratoire d'Etude Geophysique des Structures Profondes, Institut de Physique du Globe des Structures Profondes, Institut de Physique du Globe, 4 place Jussieu, Tour 14, 75230 Paris Cedex 05, France)

A segment of the Gulf of Tadjoura (Djibouti, East Africa) decreasing part of the Afar triple junction is the only entrance in the Afar depression where the active segment corresponds to the expansion area of the African seismic activity since 1928. This magnitude 5.3 earthquake in April 1971. From this seismicity (m_b) is a segment corresponds to the Afar depression. The reporting of shocks with m_b ≥ 4.5 in the Djibouti area has been substantially improved since the mid-1970's so that all this region is 4.7. (Afar) which is m_b=5.0 ± 0.4.

One is interested in examining seismicity when

Physics of the Solid Earth

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SCIENTIFIC COMMUNICATIONS

DISCUSSIONS